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known facts, the telescopic view was that of a translucent sphere whose central fires gleamed out more or less through the surface, according to the thickness of the crust. The white streaks so conspicuous at full moon were discernible and conveyed less impression of translucency than the other tracts, which were salmon-colored. The seas were in contrast to both, resembling a dull gray substance on which red light is cast. As the eclipsed orb advanced more centrally, its pink color declined and the time-honored coppery light held full sway for about half an hour. At this stage, but for the familiar outlines of the seas, the Moon seemed like a dusky intruder among the small stars of *Pisces* that shone so brightly through the shadow depths. In color it bore little resemblance to the ashen surface visible when the Moon is young. Before the end of totality the brighter hues reappeared, the pink glow on the east limb as it neared sunlight giving place again to a dull white that lingered until direct rays ended the total phase.

Though no mystery attaches to the encounter between the Earth's shadow and satellite, and its scientific value is limited, still as seen here to full advantage it was an impressive fulfillment of astronomical prediction and theory not soon to be forgotten.

SAN FRANCISCO, October 21, 1902.

PLANETARY PHENOMENA FOR JANUARY AND FEBRUARY, 1903.

BY MALCOLM MCNEILL.

PHASES OF THE MOON, P. S. T.

First Quarter,	. . . Jan. 6,	1 ^b	56 ^m	P. M.
Full Moon,	. . . Jan. 13,	6	17	A. M.
Last Quarter,	. . . Jan. 20,	3	49	
New Moon,	. . . Jan. 28,	8	39	
First Quarter,	. . . Feb. 5,	2	12	
Full Moon,	. . . Feb. 11,	4	58	P. M.
Last Quarter,	. . . Feb. 18,	10	23	
New Moon,	. . . Feb. 27,	2	20	A. M.

The Earth is at perihelion at 5 P. M., January 3d, Pacific time.

Mercury is an evening star throughout January, passes inferior conjunction with the Sun on the morning of February 2d, and becomes a morning star. It reaches greatest east elongation on January 17th, being at that time not quite 19° east of the Sun. For a few days near that date it sets at about an hour and a half after sunset, and may be seen easily in the twilight on a clear evening, and for perhaps a fortnight before time of greatest elongation it can be seen under good conditions of weather. The planet's distance from the Sun diminishes rapidly after January 17th until it reaches conjunction. It then moves rapidly away from the Sun, and on February 27th it attains greatest west elongation, not quite 27° . It may for a few days be seen as a morning star, but the conditions for visibility are not nearly as good as during January, the maximum interval between the rising of the Sun and of the planet being only a few minutes more than one hour. The greater southern declination of the planet during February more than counterbalances the effect of the greater distance from the Sun at that time. The difference in distance is due to the fact that the planet is in perihelion only a week later than the greatest east elongation of January, and it is in aphelion only nine days after the west elongation in February.

Mercury while still moving eastward passes $1^{\circ} 47'$ south of *Saturn* on January 5th. Both planets are then almost too near the Sun to be seen easily, unless weather conditions are very favorable. After both planets become morning stars there is another conjunction on February 13th. There is also a conjunction between *Mercury* and *Venus* on January 25th, after *Mercury* has begun to approach the Sun, *Mercury* passing $3^{\circ} 20'$ north of *Venus*.

Venus is now an evening star, having passed inferior conjunction with the Sun late in November. On January 1st it remains above the horizon only half an hour after sunset; but this interval increases to a little more than an hour by the end of the month, and at the end of February it is nearly two hours. On account of its greater brightness *Venus* can be seen when at a much smaller distance from the Sun than can *Mercury*, but it will not be an easy object during the early days of Jan-

uary. On the afternoon of January 9th it is in conjunction with *Saturn*, passing a little less than 1° south of the latter. The relative motions of *Venus*, *Mercury*, and *Saturn* during the early days of January are very interesting, but the planets are too near the Sun for easy observation. On the afternoon of January 30th *Venus* is also in conjunction with *Jupiter*, passing to the south, and still nearer than it did to *Saturn*,—so near that both planets can be seen together in the field of view of a small telescope.

Mars rises a little before midnight on January 1st, at about $10^h 30^m$ on February 1st, and before nine on February 28th. It moves 10° slowly eastward and southward among the stars in the western part of the constellation *Virgo* until February 15th. On that date it becomes stationary, and then begins to retrograde. Its actual distance from the Earth in miles diminishes from one hundred and seventeen millions, on January 1st, to ninety millions, on February 1st, and to sixty-nine millions, on March 1st, and there will be a corresponding increase in brightness, so that toward the end of the period the planet will become quite conspicuous and the principal feature of the eastern sky late at night.

Jupiter is an evening star in January, and remains so until February 19th, when it comes to conjunction with the Sun and becomes a morning star. It is far enough away from the Sun throughout January to be seen easily in the evening, setting about three hours after sunset on January 1st. The interval diminishes about one half during the month, and after the first few days of February the distance between planet and Sun becomes too small for visibility of the planet after sunset.

Saturn is also an evening star on January 1st, but is much nearer the Sun than is *Jupiter*. It then sets less than an hour and a half after sunset, and, being much less bright than *Jupiter*, it will not be a conspicuous object. It passes conjunction with the Sun on January 20th, and becomes a morning star. By the end of February it rises about an hour and a half before sunrise.

Uranus is a morning star, not far enough away from the Sun for naked-eye view until late in February.

Neptune is in the western sky in the evening. It is in *Gemini*, but too faint to be seen without a telescope.